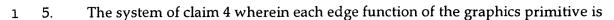
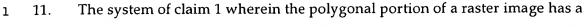
CLAIMS

What is claimed is:

- 1 1. A system for identifying pixels inside a graphics primitive of a raster image comprising:
- a memory for storing a raster image; and
- a graphics engine coupled to the memory and including a pipeline structure, the
- 5 pipeline structure receiving information related to polygonal portions of the raster
- 6 image from the memory and information related to graphics primitives from a source
- 7 for determining whether a polygonal portion of the raster image is at least partly inside
- 8 the graphics primitive.
- 1 2. The system of claim 1 wherein the pipeline structure further comprises a
- 2 predetermined number of sequential logic circuits and a predetermined number of
- 3 parallel logic circuits.
- 1 3. The system of claim 1 wherein the pipeline structure divides the polygonal
- 2 portion into a predetermined number of polygonal subportions if the polygonal portion
- 3 is at least partly inside the graphics primitive.
- 1 4. The system of claim 1 wherein the pipeline structure determines whether the
- 2 polygonal portion of the raster image is at least partly inside the graphics primitive by
- 3 evaluation of edge functions of the graphic primitive.



- based on a general edge function, $e(x, y) = e_0 + n_x x + n_y y$ where e_0 is a constant, n_x is the
- 3 x-component of a normal vector $\underline{\mathbf{n}}$ which is normal to an edge of the primitive and \mathbf{n}_y is
- 4 the y-component of the normal vector $\underline{\mathbf{n}}$.
- 1 6. The system of claim 4 wherein the edge function is evaluated at a corner vertex
- 2 of the polygonal portion, the corner vertex being farthest in a positive direction from a
- 3 primitive edge associated with the edge function.
- 1 7. The system of claim 2 wherein the pipeline structure is configured such that the
- 2 sequential logic circuits are coupled together in series followed by the parallel logic
- 3 circuits coupled together in parallel.
- 1 8. The system of claim 2 wherein the pipeline structure comprises seven sequential
- 2 logic circuits connect in series and seven parallel logic circuits coupled together in a
- 3 multi-stage pyramid structure.
- 1 9. The system of claim 3 wherein the pipeline structure determines the two
- 2 polygonal subportions by determining midpoint values of two opposite sides of the
- 3 polygonal portion of the raster image and using the midpoint values as vertices of the
- 4 two polygonal subportions.
- 1 10. The system of claim 1 wherein the pipeline structure further comprises a
- 2 predetermined number of pixel engines for determining attribute values associated
- 3 with each pixel.



- width ΔX and a height ΔY , each of the width ΔX and the height ΔY having a value of
- 3 2^m.



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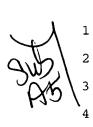
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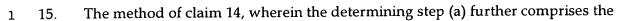
12. A method of identifying pixels inside a graphics primitive of a raster image, comprising the steps of:

- (a) determining whether a polygonal portion of the raster image is at least partly inside the graphics primitive;
- (b) dividing the polygonal portion of the raster image into a predetermined number of polygonal subportions if the polygonal portion of the raster image is at least partly inside the graphics primitive;
- (c) determining whether each polygonal subportion of the raster image is at least partly inside the graphics primitive; and
- (d) further dividing the polygonal subportion into a predetermined number of polygonal subportions if the polygonal subportion is at least partly inside the graphics primitive and is larger than a pixel.
- 1 13. The method of claim 12 further comprising the step of recursively performing (c)
- and (d) until there are no more polygonal subportions that are at least partly inside the
- 3 graphics primitive.

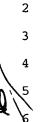


14. The method of claim 12, wherein the determining step (a) further comprises the step of receiving a plurality of values for corner vertices of the polygonal portion and arithmetic edge functions related to the graphic primitive having a coordinate reference frame located at a geometric center of the polygonal portion, the arithmetic edge

5 function corresponding to an edge of the graphics primitive.



- 2 step of evaluating an arithmetic edge function received at a corner vertex of the
- 3 polygonal portion, the corner vertex being farthest in a positive direction relative to the
- 4 corresponding edge of the graphics primitive.
- 1 16. The method of claim 15 wherein the polygonal portion is at least partly inside the
- 2 graphics primitive if all arithmetic edge functions evaluated are positive.
- 1 17. The method of claim 12 wherein the dividing step (b) further comprises the step
- 2 dividing the polygonal portion into two polygonal subportions by determining
- 3 midpoint values of two opposite sides of the polygonal portion.
- 1 18. The method of claim 12 wherein the dividing step (b) further comprises the step
- 2 of sequentially deriving two new sets of arithmetic edge functions associated with a
- 3 translated coordinate reference frame located at a geometric center of a corresponding
- 4 one of the polygonal subportions.
- 1 19. The method of claim 12 wherein the dividing step (b) further comprises the step
- 2 of sequentially outputting multiple sets of information, wherein each set of information
- 3 includes corner vertices of one of the created polygonal subportions and a
- 4 corresponding new set of derived arithmetic edge functions.



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- 20. An electronically-readable medium having embodied thereon a program, the program being executable by a machine to perform method steps for identifying pixels inside graphics primitives of a raster image, the method steps comprising:
- (a) determining whether a polygonal portion of the raster image is at least partly inside the graphics primitive;
- (b) dividing the polygonal portion into a predetermined number of polygonal subportions if the polygonal portion is at least partly inside the graphics primitive;
- (c) determining whether the polygonal subportion is at least partly inside the graphics primitive for each polygonal subportion; and
- (d) dividing the polygonal subportion into a predetermined number of polygonal subportions if the polygonal subportion is at least partly inside the graphics primitive and the polygonal subportion is larger than a pixel,.
- The electronically-readable medium of claim 20 further comprising the step of recursively performing steps (c) and (d) for each polygonal subportion larger than a pixel that is at least partly inside the graphics primitive.
 - 22. A method of identifying pixels inside a graphics primitive of a raster image comprising the steps of:

selecting a tile including a pixel;

determining if a portion of the tile is within the graphics primitive;

dividing the tile into subtiles if a portion of the tile is within the graphics primitive; and

recursively dividing each subtile having a portion within the graphics primitive until the subtile is equal in size to a pixel.

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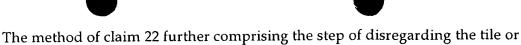
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- subtile from subsequent decomposition if the tile or subtile is outside of the graphics 2
- primitive. 3

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- The method of claim 22 wherein the step of determining further comprises 24. 1
- evaluating the tile at a corner vertex which is farthest in a positive direction relative to a 2
- current edge of the graphics primitive. 3
- 25. The method of claim 22 wherein the step of recursively dividing further 1
- comprises determining if the subtile is at least partly within the graphics primitive by 2
- evaluating the subtile at a corner vertex which is farthest in a positive direction relative 3
- to a current edge of the graphics primitive. 4
 - An electronically-readable medium having embodied thereon a program, the 26. program being executable by a machine to perform method steps for identifying pixels inside graphics primitives of a raster image, the method steps comprising:
 - selecting a tile including pixels;
 - determining if a portion of the tile is within the graphics primitive;
 - dividing the tile into subtiles if a portion of the tile is within the graphics primitive; and
- recursively dividing each subtile having a portion within the graphics primitive 8
- 9 until the subtile is equal in size to a pixel.